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(54) Radiators for space heating

(57) A radiator for space heating particularly for skirting use, comprises a series of spaced vertical waterways. The waterways are interconnected at their upper and lower ends by manifolds. The waterways and manifolds are formed by a series of interconnected elements, each having a circumferentially and outwardly extending peripheral flange lying in a generally vertical transverse plane. Adjacent flanges are interconnected around their entire periphery, and laterally extending wall portions of certain of the flanges of the elements are interconnected in pairs to form front and/or rear heat conducting walls extending at least partly along the length of the radiator.

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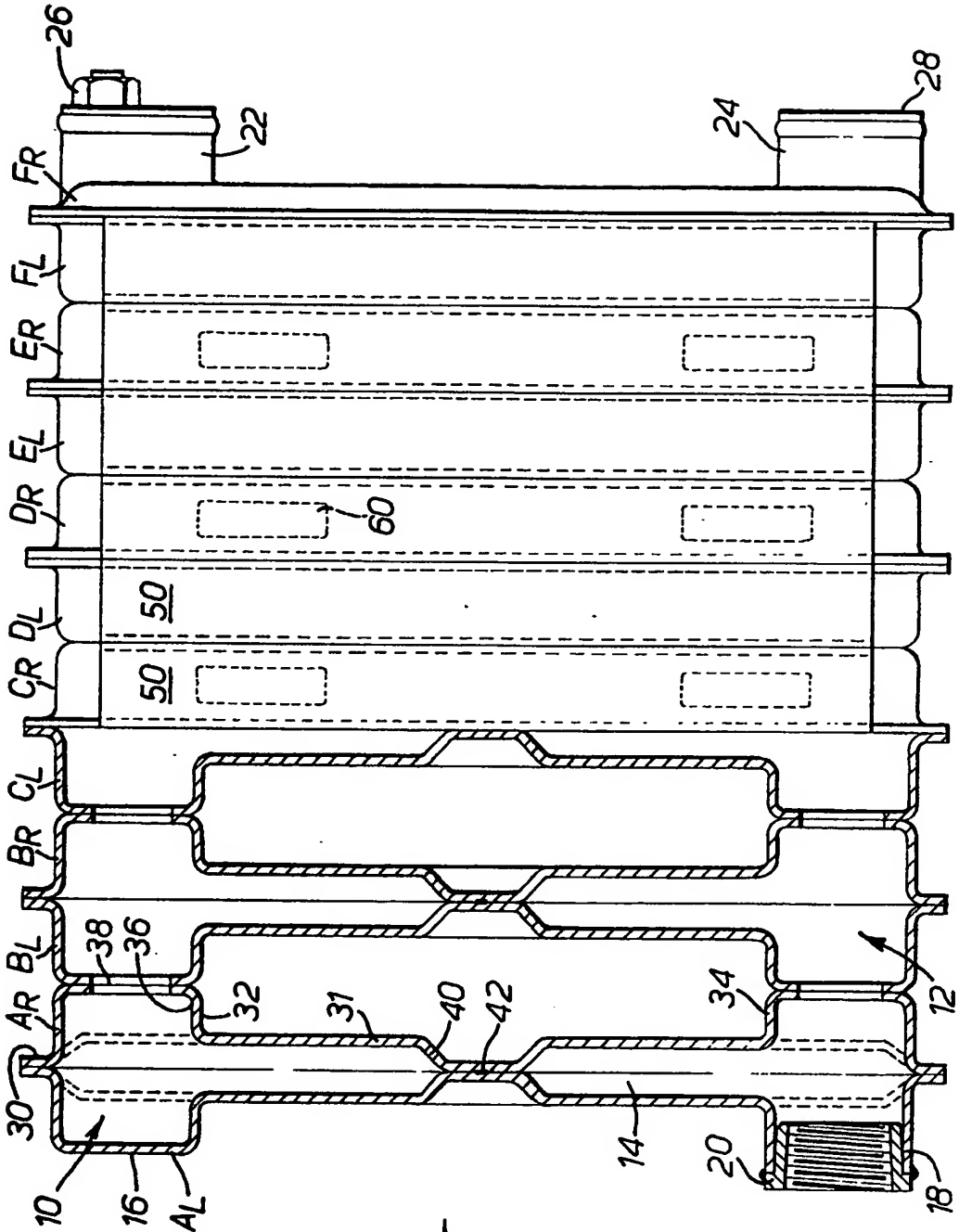
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FIG.1.

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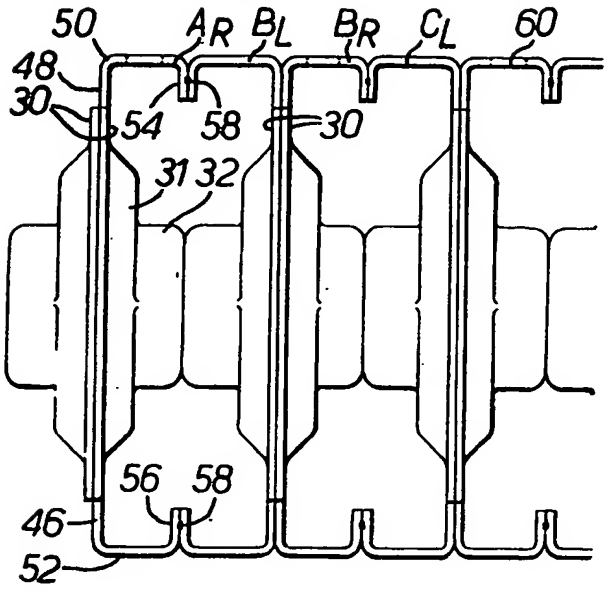

FIG. 2.

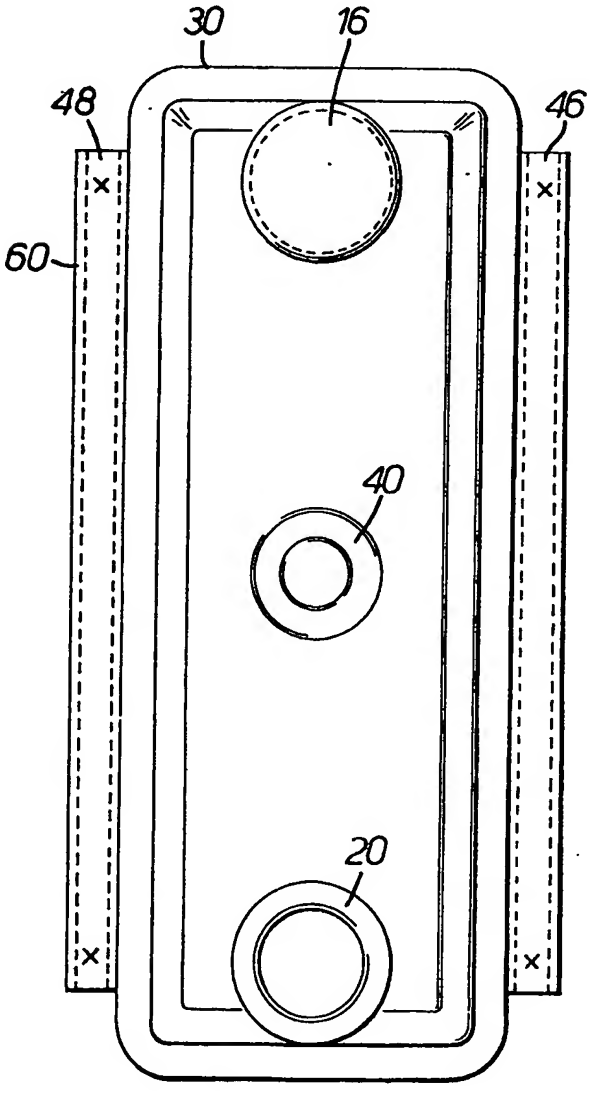

FIG. 3.

SPECIFICATION

Radiators for space heating

This invention relates to radiators for space heating and particularly, but not exclusively, to the type known as skirting radiators.

Most skirting radiators at present marketed are simply formed by one or more copper tubes extending horizontally and on which are secured vertical aluminium fins, the fins usually being a mere press fit on the copper tube or tubes. In some ways these constructions do not really form a water-filled radiator at all since there is no circulation through heat dissipating waterways between upper and lower manifolds. As a consequence, with current forms of skirting radiators the heat output per unit length is relatively low e.g. of the order of 400 watts per metre. As a consequence, in order to heat a room, a significant length of skirting radiator is required and in some situations it is not possible to use skirting radiators at all due to their low output.

The present invention has as one of its main objects a novel design of radiator which can be applied particularly to skirting radiators wherein the heat output per unit length is significantly increased as compared with current constructions.

According to another aspect of the present invention a radiator comprises a series of generally vertical spaced waterways which are interconnected at their upper and lower ends respectively by generally horizontal upper and lower manifolds, the waterways and manifolds being formed at least in part by a series of interconnected radiator elements each having a circumferentially and outwardly extending peripheral flange lying in a generally vertical transverse plane, the peripheral flanges of adjacent elements being interconnected around their entire periphery, laterally extending wall portions of at least certain of the peripheral flanges of the elements being interconnected in pairs thereby to form front and/or rear heat conducting walls extending along at least part of the length of the radiator.

Accordingly to another aspect of the present invention a radiator comprises a series of generally vertical spaced waterways which are interconnected at their upper and lower ends respectively by generally horizontal upper and lower manifolds, the waterways and manifolds being formed at least in part by a series of interconnected radiator sections defined herein from left to right as sections A, B, C, etc., each radiator section being formed by a pair of abutting elements defined herein from left to right as elements $A_L A_R$; $B_L B_R$; $C_L C_R$. . .etc., each element having a circumferentially and outwardly extending peripheral flange lying in a generally vertical transverse plane, an upper and a lower manifold portion, and a waterway portion, at least certain of the peripheral flanges having at least one laterally extending wall portion, the peripheral flanges of adjacent pairs of elements being interconnected around their entire periphery, the pairing of these flanges being in the following manner

$$A_L A_R; B_L B_R; C_L C_R; \ldots .\text{etc.},$$

the upper and lower manifold portions respectively of the following pairs of elements being interconnected to form the upper and lower manifolds

$$A_R B_L; B_R C_L; C_R D_L \ldots \text{etc.},$$

the laterally extending wall portions of the peripheral flanges of the following pairs of elements being interconnected

$$A_R B_L; B_R C_L; C_R D_L \ldots \text{etc.},$$

thereby to form a heat conducting wall extending along at least part of the length of the radiator.

The invention may be carried into practice in various ways but one specific embodiment will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a front elevation, partly in section, of a radiator formed in accordance with the present invention;

Figure 2 is a plan view of the left hand end of the radiator of Figure 1, and

Figure 3 is an end elevation of the radiator as viewed in the direction of the arrow 3 in Figure 1.

The radiator shown in the drawings broadly comprises upper and lower horizontally extending manifolds 10 and 12 respectively which are interconnected, in the specific example shown in Figure 1, by six vertically extending waterways 14.

The radiator is fabricated from a series of pressed metal elements which are welded together in a manner to be described. The pressings include an end element A_L on the far left and an end element F_R on the far right these two elements being individually formed pressings such that the left hand element A_L has a closed upper wall portion 16 forming the end of the upper manifold 10 and a cylindrical lower open end 18 which receives a pipe connection 20 at the left hand end of the lower manifold 12.

The right hand element F_R has upper and lower cylindrical open ended portions 22 and 24 respectively which are arranged to receive a 1/8 inch BSPT air bleed connector 26 in the case of the upper end, and a $\frac{1}{2}$ inch BSPT pipe connector 28 in the case of the lower end.

The remaining elements A_R to F_L are identical to one another and can be formed by the same press, and when assembled the elements are simply turned and faced in the appropriate direction, thus forming pairs $B_L B_R$; $C_L C_R$; $D_L D_R$ . . .etc.

Each of the elements A_R to F_L has a circumferentially extending peripheral flange 30 which is arranged to abut and be welded to a similar flange

on the adjacent element of the pair. Thus with the nomenclature provided in this example the peripheral flanges 30 of the elements A_L and A_R are abutted and welded and similarly the peripheral flanges of elements B_L and B_R and so on. It will be appreciated that the abutting faces of these pairs of flanges lie in vertical planes extending transversely of the length of the radiator. Each element affords a central waterway portion 31 merging at its upper and lower ends respectively with longitudinally extending generally cylindrical upper and lower manifold portions 32 and 34 respectively. With the exception of the end elements A_L and F_R the manifold portions have end walls 36 each provided with a central opening 38, the arrangement being such that pairs of the end walls 36, for example of elements A_R and B_L, abut one another around the openings 38 and these abutting portions are welded together so that the manifold portions, with their openings 38, together form continuous horizontal spaces defining the upper and lower manifolds 10 and 12. It will be appreciated that the abutting faces of the end walls 36 of the manifold portions of any abutting pair of elements lie in a further vertical plane extending vertically and positioned centrally between the vertical planes defining the abutting faces of the pairs of peripheral flanges 30.

Referring to Figure 2, it is to be noted that the waterway portions 31 extend from front to back over a substantial proportion of the front to back depth of the radiator, whereas the manifold portions 32 and 34 occupy approximately one third of the front to back depth of the radiator, and, as shown in Figure 2, are centrally positioned in this front to back depth.

The waterway portions 31 at their mid position are formed with depressions 40 which are spot-welded together at 42.

By virtue of the fact that the peripheral flanges 30 on the one hand, and the abutting walls 36 of the manifold portions on the other hand are resistance welded together, a completely water tight construction is achieved. In the case of the spot-welding 42 between the depressions 40 no sealing is required since the depressions are formed in the centre of the waterway, but the depressions 40 and the spot-welds 42 form a central strengthening of the columns formed by the waterways.

The construction so far described and shown in the drawings may typically be 2 3/4 inches in front to back depth from the vertical edges of the peripheral flanges 30, the spacing between the vertical planes defining the abutting faces of the peripheral flanges 30, being approximately 1 5/16 inches, the spacing between the external faces of the vertical walls defining the waterways 31 being approximately $\frac{1}{2}$ inch, the height of the radiator between the centre lines of the manifolds being approximately $5\frac{1}{2}$ inches and the vertical external diameter of the manifold portions 34 being approximately 1 1/8 inches. The diameter of the openings 38 is 3/8 inches. A construction as so far described, is found to produce a significantly higher heat emission output as compared with conventional skirting radiators. For example on one test the figure achieved with this type of construction was of the order of 510 watts per metre.

Despite this significant increase in output the invention provides further emission surfaces in a manner to be described, which increases the emission output to the order of 750 watts per metre. For this purpose, referring to Figure 2, the vertical edges of the peripheral flanges 30 are provided with forwardly and rearwardly extending wing portions 46 and 48 respectively (except in the case of the end elements A_L and F_R). Each of these wing portions 46 and 48 merges with a laterally extending wall portion, numbered 50 in the case of the rear wings 48, and numbered 52 in the case of the front wings 46. These wall portions terminate in inwardly turned flanges, 54 in the case of the wall portions 50, and 56 in the case of the wall portions 52. As shown in Figure 2, the pressings are so formed that the outer faces of the flanges 54 and 56 lie in the same vertical transverse plane as the outer face of the end wall 36 of the manifold portion 32 of that radiator element.

As shown in Figure 2 these faces of the flanges 54 and 56 abut the corresponding flanges of an adjacent radiator element and the two flanges are spot welded together as indicated at 58.

Using the nomenclature previously referred to, it will be observed that it is the flanges 54 and 56 of adjacent radiator elements A_R and B_L; B_R and C_L and so on which abut one another and are welded together. It will also be appreciated that it is manifold portions 32 of the same pairs of radiator elements which have their walls 36 abutting and welded together. In contrast, in the case of the peripheral flanges 30, it is the flanges of the pairs A_L A_R; B_L B_R; C_L C_R and so on which abut and are welded together.

Referring to Figures 1 and 3 it will be seen that the wings 46 and 48, the wall portions 50 and 52, and the flanges 54 and 56 all terminate at their upper ends at a position approximately 1 1/8 inches below the upper edges of the peripheral flanges 30. In the same way the lower ends of the walls 50 and the flanges 54 and 56 terminate above the lower edges of the peripheral flanges 30.

The welding together of the front and rear wall portions 52 and 50 respectively provides the whole radiator effectively with complete front and rear walls. In the case of the rear wall formed by the wall portions 50, alternate wall portions are provided with rectangular openings 60 at two vertically spaced positions in order to permit the radiator to be mounted on standard wall brackets at any suitable position.

The provision of the front and rear walls which are formed as integral portions of the pressings forming the elements of the radiator has several distinct advantages. Firstly because the walls are

integrally formed with the remainder of the radiator, conducted heat can readily pass from the manifolds and the waterways to the front and rear walls and either be radiated therefrom or conducted therefrom by convected air flow rising through the radiator and around the waterways and manifolds and passing along the internal and external surfaces of the front and rear walls.

Apart from providing a very significant increase in emission output, the provision of the front and rear walls, with their welded inwardly directed flanges 54 and 56 provides the radiator as a whole with considerable rigidity which would not otherwise be achieved simply by welding the abutting manifold walls 36.

It is believed that the construction shown in the drawings, if necessary with certain stylistic changes, could provide the whole radiator without additional parts, so that it may be unnecessary to provide a conventional casing, for example in the case of a skirting radiator. However if aesthetic requirements call for it, top and/or bottom appearance walls can be included which would have appropriate perforation or slotting to allow for convected air flow. Similarly, if desired, a further front wall can be provided if required which may, with the top and/or the bottom walls define an appearance casing. Such a casing could also have end walls if required.

Claims

1. A radiator comprising a series of generally vertical spaced waterways which are interconnected at their upper and lower ends respectively by generally horizontal upper and lower manifolds, the waterways and manifolds being formed at least in part by a series of interconnected radiator elements each having a circumferentially and outwardly extending peripheral flange lying in a generally vertical transverse plane, the peripheral flanges of adjacent elements being interconnected around their entire periphery, laterally extending wall portions of at least certain of the peripheral flanges of the elements being interconnected in pairs thereby to form front and/or rear heat conducting walls extending along at least part of the length of the radiator.

2. A radiator comprising a series of generally vertical spaced waterways which are interconnected at their upper and lower ends respectively by generally horizontal upper and lower manifolds, the waterways and manifolds being formed at least in part by a series of interconnected radiator sections defined herein from left to right as sections A, B, C, etc., each radiator section being formed by a pair of abutting elements defined herein from left to right as elements $A_L A_R$; $B_L B_R$; $C_L C_R$ . . .etc., each element having a circumferentially and outwardly extending peripheral flange lying in a generally vertical transverse plane, an upper and a lower manifold portion, and a waterway portion, at least certain of the peripheral flanges having at least one laterally extending wall portion, the peripheral flanges of adjacent pairs of elements being interconnected around their entire periphery, the pairing of these flanges being in the following manner

$$A_L A_R; B_L B_R; C_L C_R \ldots \text{etc.},$$

the upper and lower manifold portions respectively of the following pairs of elements being interconnected to form the upper and lower manifolds

$$A_R B_L; B_R C_L; C_R D_L \ldots \text{etc.},$$

the laterally extending wall portions of the peripheral flanges of the following pairs of elements being interconnected

$$A_R B_L; B_R C_L; C_R D_L; \ldots \text{etc.},$$

thereby to form a heat conducting wall extending along at least part of the length of the radiator.

3. A radiator as claimed in Claim 1 or Claim 2 in which each laterally extending wall portion is integral with its peripheral flange and lies at right angles thereto in the general direction of length of the radiator.

4. A radiator as claimed in Claim 3 in which each laterally extending wall portion at its edge remote from the peripheral flange with which it is integral has an inturned edge flange lying in a transverse plane and abutting the corresponding edge flange of the adjacent element, the two edge flanges being welded together.

5. A radiator as claimed in Claim 2 or either of Claims 3 and 4 when appendant to Claim 2 in which the interconnected manifold portions have abutting transverse walls which are welded together, these walls having aligned openings therein thereby to interconnect the spaces within adjacent manifold portions and to form the respective manifold.

6. A radiator as claimed in Claim 4 and as claimed in Claim 5 in which the abutting faces of the edge flanges of the wall portions of any pair of elements and the abutting faces of the end walls of the manifold portions of those elements lie in the same transverse plane.

7. A radiator as claimed in any one of the preceding Claims in which the laterally extending wall portions together define a front wall extending the whole length of the radiator.

8. A radiator as claimed in any one of the preceding Claims 1 to 6 in which the laterally extending wall portions together form a rear wall extending the length of the radiator.

9. A radiator as claimed in Claim 8 in which at least certain of the laterally extending wall portions are apertured to form location means for securing to wall brackets.

10. A radiator as claimed in any one of the preceding claims in which each element is formed entirely as a pressing from a single piece of sheet metal.

11. A radiator as claimed in Claim 2 in which portions of the pairs of elements

$A_L A_R$; $B_L B_R$; $C_L C_R$ . . .etc.,

are formed with depressions intermediate the length of the waterways defined by those pairs of elements which depressions are in abutting relationship in a plane common to a plane in which the abutting faces of the peripheral flanges lie.

12. A radiator substantially as specifically described herein with reference to the accompanying drawings.

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